

App. No. 10/605,811
Amendment dated October 23, 2005
Reply to Office action of June 22, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claim 1 (currently amended): Carried out in the manufacture of a fluid dynamic-pressure bearing unit having a shaft section including at least a shaft, and a sleeve section including at least a sleeve and a thrust bush, wherein in between the shaft section and the sleeve section a continuous oil-retaining gap including a radial bearing and/or a thrust bearing is formed, the shaft section and the sleeve section are disposed to let one rotate relative to the other with the gap intervening, and in a portion of the bearing unit in contact with air that connects the oil-retaining gap with the atmosphere a taper-seal area is formed, a method of manufacturing fluid-dynamic-pressure bearings, comprising:

a first step including a substep (a) of, with the fluid-dynamic-pressure bearing unit not yet filled with oil, reducing the pressure of the environment surrounding the bearing unit to at least a first predetermined pressure, or lower and a substep (b) of injecting a first volume of oil into the taper-seal area of the bearing unit;

a second step, carried out after termination of said first step, of keeping the environment surrounding the bearing unit at a pressure equal to, or pressurizing to a pressure higher than, that of the bearing unit immediately prior to said second step, then injecting a second volume of oil into the taper-seal area of the bearing unit, said second step being carried out one cycle, or a number of cycles more than that; and

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a pressure restoration step, carried out following termination of said second step, of restoring to atmospheric pressure the environment surrounding the bearing unit.

Claim 2 (currently amended): Carried out in the manufacture of a fluid-dynamic-pressure bearing unit having a shaft section including at least a shaft, and a sleeve section including at least a sleeve and a thrust bush, wherein in between the shaft section and the sleeve section a continuous oil-retaining gap including a radial bearing and/or a thrust bearing is formed, the shaft section and the sleeve section are disposed to let one rotate relative to the other with the gap intervening, and in a portion of the bearing unit in contact with air that connects the oil-retaining gap with the atmosphere a taper-seal area is formed, the bearing unit therein being designed to retain a preestablished oil volume, a method of manufacturing fluid-dynamic-pressure bearings, comprising:

a ~~third~~ first step including a substep (a) of, with the fluid-dynamic-pressure bearing unit not yet filled with oil, reducing the pressure of the environment surrounding the bearing unit to at least a first predetermined pressure, or lower and a substep (b) of injecting a ~~third volume of oil~~ into the taper-seal area of the bearing unit oil in an amount that exceeds said preestablished volume;

a ~~fourth~~ second step, carried out after termination of said ~~third~~ first step, of keeping the environment surrounding the bearing unit a pressure equal to, or pressurizing the pressure higher than, that of the bearing unit immediately prior to

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the second step, and of removing a ~~fourth surplus~~ volume of oil from the taper-seal area to reduce to a certain volume the oil occupying the taper-seal area; and

a pressure restoration step, carried out following termination of said ~~fourth second~~ step, of restoring to atmospheric pressure the environment surrounding the bearing unit.

Claim 3 (currently amended): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, further comprising:

a ~~fourth~~ third step, carried out after termination of said second step, of keeping the environment surrounding the bearing unit at a pressure equal to, or pressurizing to a pressure higher than, that of the bearing unit immediately prior to said ~~fourth second~~ step, and of removing a ~~fourth surplus~~ volume of oil from the taper-seal area; wherein

said pressure restoration step is carried out following termination of said step.

Claim 4 (original): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, wherein consecutive to any one cycle of said second step pressure reduction of the environment surrounding the bearing unit is carried out.

Claim 5 (currently amended): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, wherein in said substep (a), the predetermined pressure

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~~in advance of said first step the environment surrounding the bearing unit not yet filled with oil is reduced to said first pressure or lower;~~

~~the bearing unit surrounding environment is maintained in that state for a predetermined time period;~~

~~and subsequently said first step is carried out.~~

Claim 6 (currently amended): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 2, wherein~~[[:]]~~ in said substep (a), the predetermined pressure

~~in advance of said third step the environment surrounding the bearing unit not yet filled with oil is reduced to said first pressure or lower;~~

~~the bearing unit surrounding environment is maintained in that a state for a predetermined time period;~~

~~and subsequently said third step is carried out.~~

Claim 7 (currently amended): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 5, wherein:

said first predetermined pressure is 100 Pa or less; and

said predetermined time is 10 seconds or more.

Claim 8 (currently amended): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 6, wherein:

said ~~first~~ predetermined pressure is 100 Pa or less; and

said predetermined time is 10 seconds or more.

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Claim 9 (original): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 1, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

Claim 10 (original): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 2, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

Claim 11 (original): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 5, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

Claim 12 (original): A method of manufacturing fluid-dynamic-pressure bearings as set forth in claim 6, wherein at least a portion of the sleeve is composed of an oil-impregnable porous substance.

Claim 13 (withdrawn): An apparatus for manufacturing a fluid-dynamic-pressure bearing unit configured so that its oil- and surrounding-air interface is positioned within its micro-gap, the bearing-unit manufacturing apparatus comprising:

- a vacuum chamber;
- an evacuating means equipped with evacuating power to evacuate the interior of said vacuum chamber to less than 100 Pa, the evacuating power being adjustable;
- a pressure gauge for indicating pressure within said vacuum chamber;

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a gas-introducing mechanism enabled for introducing an adjustable volume of gas into the interior of said vacuum chamber, and for restoring said vacuum chamber interior to at least atmospheric pressure;

an oil-injection nozzle having a tip end whose diameter is less than or equal to how open an orifice into the micro-gap is, at least the tip end of said oil-injection nozzle being installed in said vacuum chamber interior;

an oil-supply mechanism for adjustably supplying a predetermined volume of oil to said oil-injection nozzle;

an oil-injection-nozzle positioning mechanism;

an oil-removal nozzle having a tip end whose diameter is less than or equal to how open the orifice into the micro-gap is, at least the tip end of said oil-removal nozzle being installed in said vacuum chamber interior;

an oil-aspirating mechanism for adjustably aspirating a volume of oil from said oil-removal nozzle;

an oil-removal-nozzle positioning mechanism;

a control mechanism for executing, in response to what the pressure that said vacuum gauge indicates is, control of evacuation operation by said evacuation means, gas-introducing operation by said gas-introducing mechanism, oil-supplying operation by said oil-supplying mechanism, and oil-aspirating operation by said oil-aspirating mechanism, at least in that operational sequence.

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Claim 14 (withdrawn): A spindle motor utilizing, as a bearing mechanism for supporting its rotatory sections, a fluid-dynamic-pressure bearing unit manufactured by the method set forth in claim 1.

Claim 15 (withdrawn): A spindle motor utilizing, as a bearing mechanism for supporting its rotatory sections, a fluid-dynamic-pressure bearing unit manufactured by the method set forth in claim 2.

Claim 16 (withdrawn): A signal record-and-playback device, comprising:
a recording medium;
the spindle motor set forth in claim 14, for rotationally driving said recording medium;
a signal access means for recording signals onto and reading signals out from said recording medium; and
a positioning means for shifting said signal access means in a radial direction with respect to the rotational center of said recording medium.